# INTRODUCTION

While the State of Missouri is more likely to experience a natural or technological disaster, the threat of terrorism remains a possibility. Spatial technology, which includes Geographic Information Systems (GIS), Global Positioning Systems (GPS), specific spatial application software, and geospatial data sets, provides an excellent infrastructure to support many emergency response and homeland security initiatives. In fact, a strong spatial capability is essential to facilitate geographic coordination and can greatly improve interagency communications. The paragraphs below describe the application of spatial technology to the three previously defined functions of homeland security.

**Detect and Anticipate:** The homeland security plan should support the assessment of potential threats and risks. Spatial technology is ideally suited to support these initiatives through the following:

*Emergency Management Planning*. Many Missouri communities subjected to natural disasters such as tornadoes, floods, earthquakes and fires or exposed to potential man-made disasters such as a nuclear power plant incidents have developed and implemented Emergency Management Plans. Often these plans were created using GIS as a technology centerpiece. The work done for these plans can be leveraged and applied to homeland security / public safety activities such as:

a) Hazard and Risk Assessment – By identifying potential hazards, areas of high risk and populations at risk (i.e. daycare facilities and nursing homes), managers can work towards mitigating or possibly eliminating potential disasters.

b) Evacuation Route Planning – Through the creation of road centerline data with associated traffic information such as capacity and flow rates, advanced evacuation route planning can take place.

c) Resource Deployment Planning – The minutes and hours immediately after a disaster are fraught with confusion. Knowing in advance where resources such as medical personnel, utility repair crews and equipment, and public works personnel and equipment are located allows their deployment to be organized and more effective for reducing human losses of life and property. A GIS system can be used to update emergency response routing by incorporating field data (impassible roads and closures) and aerial imagery to provide flexibility and adaptability to deployment and response plans.

*Asset Inventory*. Locating critical assets such as electrical transformers, underground storage tanks, dump trucks, fire hydrants, and water supply access points is the first step in providing safety for our citizenry. Geospatial technology provides the ideal tool to field locate and inventory many types of assets. The GIS can then be used to analyze the spatial relationships for the development of a strategy to secure the facilities as well as enable their effective use within an emergency.

**Protect and Defend:** A second area of the all-hazards plan is aligning the resources, devices and technologies to protect our citizenry and assets. Spatial technology can again play a role in this deployment in the following ways:

a) Situation Analysis – Once a potential risk has been identified, a GIS can be employed to analyze the spatial details of options available to deal with and respond to the situation. For example a GIS can be used to help identify and prioritize evacuation zones and routes for any given scenario generated.

b) Demographic Studies/Plans – Detailed demographic information such as population densities, age, socioeconomic, and ethnic make-up can be used in a GIS to identify particularly vulnerable populations due to age, income, mobility, or density.

c) Plume Analysis – A GIS can be used to analyze the extent of a chemical spill incident using either plume analysis or stream flow analysis based on the chemical in question.

d) Staging Analysis – A GIS can be used to identify deficiencies in staging and response capabilities. Using traffic and demographic data, the GIS can indicate areas that require emergency response times that are not within acceptable limits.

**Respond and Recover**. After disaster has struck, spatial technology can be used in many ways to collect, maintain, integrate, and distribute location-based information. This information can assist local, state, and federal organizations involved in emergency operations with situational awareness. The following applications use GIS as a base technology:

a) Search and Rescue – A GIS can prove to be an invaluable tool to support search and rescue efforts. Initial search logistics can be supported through integration of aerial photography and demographic information. The GIS can aid in determining sub-search areas based on terrain, vegetation and demographics. Rescue personnel can also be equipped with GPS receivers so their search path can be logged and used to assure comprehensive coverage. Imagery and GPS can also be used to locate objects covered by debris.

b) Location-based Intelligence – A GIS can provide decision-makers with location-based intelligence through spatial analysis, visualization, modeling, tactical planning and command and control. The result is more efficient and effective decision making.

c) Emergency Vehicle Dispatch and Tracking – Emergency vehicles equipped with GPS and wireless technology can be tracked using GIS technology. Calculating travel time based on road closures and other field information, dispatchers can then deploy the most optimal resource to a location. The GIS can potentially become the central coordinating technology for this dispatch.

d) Damage Assessment – Quick and accurate damage assessment is critical to expedite the procurement of disaster relief funding. Analyzing aerial imagery, tax parcel data, and demographic information of the disaster area can help make initial damage determinations. Gis can also validate the initial damage counts and estimates and provide further analysis.

The common element of these and many other homeland security applications is the need for geographic location. Spatial technology provides the tools to discover trends and visualize the relationship between features that cannot otherwise be seen. Many municipalities and state organizations already have a GIS in place to support normal organizational functions. Quite often with only minor data enhancements and modest application investments, these systems can be expanded to support sophisticated emergency response and homeland security activities. It is important to note that some of the greatest benefits from GIS in the recent disasters remain in simple tasks like mapping road closures, geocoding/GPSing last known locations of residents, and simply printing hundreds of maps and images in short time frames for use by first responders.

## Geospatial Integration and Public Safety Support

The development, use, and maintenance of geospatial information and technologies across a statewide enterprise are critical components of the State Homeland Security Plan (SHSP). Implementation of this geospatial strategy fosters more effective access to geospatial information maintained statewide by municipalities, counties, state, and federal agencies. This strategy complements federal homeland security and geospatial programs of the Department of Homeland Security, National Geospatial-Intelligence Agency, Department of Defense, and the USGS National Geospatial Programs Office.

The following is a list of activities that integrate geospatial elements to support the goals and objectives of the SHSP. Federal Homeland Security funding is available to both the State and its local governmental entities. ***The State Homeland Security Plan should permit these funds to be spent in support of the following geospatial activities.*** This list is not all-inclusive but provides a starting point for organizing and leveraging Missouri's geospatial support to public safety.

### 1. State Emergency Operations Plan (SEOP)

The SEOP is the State's official guiding document for response to natural and man-made disasters that affect the State. This plan is currently being updated and it is critical that geospatial technologies, services, and data be an integral part of the new plan.

**2. The Governor's Homeland Security Advisory Council (HSAC)**

It is imperative that geospatial technologies, services, and data resources within the state be represented within this Council. The appointment of the State GIO to this Council would achieve this goal. Creation and sponsorship of a HSAC subcommittee focused on IT issues relevant to the public safety mission and all-hazards response should be formulated. The integration of geospatial technologies, data, and services with emergency response (EOCs, first responders, etc.) will be promoted if funds can be assigned to specifically bridge these areas.

**3. Equipment Grant**

The U.S. Department of Homeland Security, Office for Domestic Preparedness Equipment Grant program is an opportunity to provide geospatial capacity to all units of government who would like to initiate a program or expand their current program to include aspects specifically supporting the public safety – all hazards arena. This would include acquisition of geospatial technologies such as GIS software, computer systems, peripheral devices, GPS, image analysis software, and other components as defined in the equipment listing provided within the State Grants program.

**4. Critical Infrastructure Identification, Collection, and Protection**

The preservation of the infrastructure and key assets of the State of Missouri is vital. It is fundamental to maintaining basic governmental services and preserving human life and property. Data categories may include, as examples, aerial imagery, street centerlines and addresses, building footprints, elevation, nursing homes, critical infrastructure, or any of the themes listed by the Missouri GIS Advisory Committee (MGISAC) Homeland Security Subcommittee or the Homeland Security Infrastructure Plan (HSIP). Particular attention should be given to data that are part of the Minimal Essential Data Sets (MEDS). This infrastructure must first be categorized, inventoried, and standardized if it is to be useful. Development activities should be required to leverage existing federal standards for critical asset data collection as well as the current (and on-going) development of Missouri Adaptive Enterprise Architecture (MAEA) artifacts that outline, as templates, how data elements should be defined, collected, and integrated. The development of emergency management standard elements can and should be passed to the MAEA Information Domain in conjunction with the MGISAC's Homeland Security Subcommittee. These templates, processes, and standards can then be the foundation for interoperability and data sharing among intergovernmental jurisdictions.

These data must then be collected utilizing these standards and processes. Funding at the local level must be made available so that data deficiencies and gaps can be filled. GIS technology can be used to develop a comprehensive database of all the critical state, federal, local and private facilities / infrastructure. These standards for development and data sharing should be implemented as compliance criteria for receiving this Federal funding.

**5. Data Sharing Agreements and Partnerships with Local Government and Industry**

State Agencies have ongoing informational and operational relationships with their counterparts at both the Federal and local government level, as well as with private business and industry. Additionally, information is integrated and disseminated as necessary to other groups at all levels of government as well as the private sector. The development of templates for intergovernmental / inter-organizational data sharing and exchange should be pursued so that partnerships with local and regional governments, business, and industry can be expanded and formalized. These agreements can provide a greater level of cooperation, support, and data sharing as we work toward a fully coordinated exchange between and among levels of government, industry, and business partners.

**6. Computer Services and GIS Database Recoverability and Restoration Plans**

The State of Missouri utilizes a number of computer systems and networks to conduct geospatial business on a daily basis. The vast majority of these systems contain critical data that if lost or

compromised will have an impact upon state operations and service delivery to citizens. To ensure reliability of computer systems, the Information Technology Services Division (ITSD) must support work with state agencies, local governments, industry, and the private sector as well as other relevant geospatial data holders (i.e. Missouri Spatial Data Information Service (MSDIS)) to develop data recovery and business continuity plans and procedures. This may include data backup, restoration of computer network lines, equipment needs, system security and general system requirements relating to protection of critical records from unauthorized access and to promote high availability in the event of an incident.

**7. The State Emergency GIS Response Team and Training**

Create a special GIS technical team composed of members from Missouri's geospatial community and surrounding states who are willing to work on emergency operations. This includes the development of specialized emergency response training courses in geospatial technologies that can then be promoted to the broader response community. A goal is to provide first responders the opportunity for training, education, and exercising with geospatial technologies. It is also critical to develop an inventory of GIS contacts and GIT trained specialists within the state.

**8. Missouri Citizen Corps Advisory Council**

Once established, this component of the *USA Freedom Corps* will provide the focal point and leadership to work with local communities in the establishment and funding of local Citizen Corp Council geospatial program elements. Members of the State council could include representatives of: State departments, Missouri Extension, Missouri Municipal League, MSDIS, and the Missouri Mappers Association to name a few. The Citizen Corps program is designed to enhance and build upon programs already functioning in our communities.

## Desired State Outcomes

This geospatial strategy is based upon maintaining a coordinated effort between Federal, State and local governments, and on identifying strategies and activities deemed essential to fulfill the mission of a prepared and secure Missouri. There must be an understanding that in creating a fully coordinated strategy, standards must exist and should be developed in a coordinated and cooperative manner between local and state government agencies to avoid cumbersome plans and inefficiency in the face of an event or disaster.

In order to assure adequate preparedness, measurable benchmarks of accountability will have to be established and maintained. The efforts required to provide a secure and prepared state environment will need to be sustained over a period of years. Clearly some programs will need additional funds in order to build and sustain the geospatial aspects of the homeland security mission. This will require considerable federal funding support and a commitment of state resources to accomplish goals mandated by the federal government. The State will need accurate assessments of local capabilities so funding support can be targeted where the greatest needs exist. The solutions are not simple or easy and will need to depend upon cooperation and partnerships that can only be attained through comprehensive emergency planning and collaborative federal, state and local efforts.

Achieving the strategic initiatives and implementing the activities identified within this geospatial strategy will take time, but the strategies identified in this document will improve the overall effectiveness of our state's emergency response system and yield many benefits for Missouri. A partnership of state and local government with a commonly identified goal will be better able to meet the risks associated with natural and man-made events. The development of this geospatial strategy signifies an important step toward this goal.